



Beyond Extraction

Mining, metal and mineral's
new era of innovation and
responsible sourcing



Table of contents

Operating in the new world	3
Navigating challenges and industry trends	4
Realizing the power of digital adoption	5
AVEVA's Impact: Driving efficiency, sustainability, and safety	6
From mine to materials: Unifying the value chain with a digital thread	7



Operating in the new world

Mining, metals and minerals industries are accelerating digital adoption—using AI, machine learning, and automation—to slash costs, boost efficiency, and solve raw material challenges. They're optimizing extraction, integrating renewables, and driving nature-positive outcomes.

By investing in critical minerals and forging strategic partnerships, they're powering the energy transition, including green steel. Working closely with governments and communities, they ensure responsible sourcing, protect their social license, and lead the charge on sustainability and global energy security.

2x
Demand for critical
minerals by 2030¹



Operating in
the new world

Navigating challenges
& trends

Power of digital
adoption

AVEVA's
Impact

From mine
to materials



Navigating challenges and industry trends



Productivity and Rising Costs

Companies are grappling with rising labor, production and energy costs, which are squeezing margins and hindering new project development. Additionally, a shortage of skilled workers, exacerbated by an aging workforce, poses a significant challenge as the industry strives to attract talent to support its digital transformation and sustainability agendas.



Resource Depletion and Raw Materials Supply

Resource depletion and supply chain disruptions are significantly impacting the industry. Declining ore grades are increasing extraction costs, while rising exploration costs and fewer discoveries put pressure on the industry to innovate in extracting and optimizing critical minerals and metals. Simultaneously, companies face unprecedented price volatility and disruptions due to geopolitical tensions.



Balancing Growth with Capital Discipline

Metals and mineral producers are under pressure from investors to balance growth with capital discipline. They need to allocate capital wisely, manage costs effectively, and deliver returns to shareholders.



Sustainability and Energy Management

Metals and mineral producers face intense pressure to reduce their carbon footprint and achieve net-zero emissions by 2050, necessitating transformation in operations, investments in renewable energy, and adoption of new technologies. Simultaneously, companies must address increasing scrutiny from communities and governments regarding their environmental and social impacts to build trust and maintain their social license to operate.



Technology, Innovation, and Digitalization

The industry is rapidly adopting new technologies, such as artificial intelligence (AI), automation, and robotics. This transformation requires significant investment and a skilled workforce.

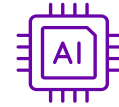
Realizing the power of digital adoption

Technology and digital innovation goes far beyond cost reduction and efficiency gains. Leaders are attracting and empowering the next-generation workforce by making industrial roles more digital, transforming remote collaboration, and introducing immersive ways to simulate and optimize operations—all while keeping safety at the forefront.

Advanced technologies are also modeling the performance of next-generation assets like electric arc furnaces, battery and electric trucks, integrating control systems to enable autonomy, and supporting operations in increasingly electrified, digitally connected environments. At the same time, data-driven methods are powering precision mining, enabling more accurate, efficient, and sustainable resource extraction.

30%  Rise in production costs driving up the need for cost-saving technology²

Artificial Intelligence and Generative AI



Cloud Technology and Hybrid Solutions



Advanced Analytics



Automation & Autonomy



Simulation & Digital Twin



AVEVA's Impact: Driving efficiency, sustainability, and safety

From extraction to recycling, AVEVA's digital solutions maximize agility and productivity, while ensuring safety and sustainable practices, through trusted insights. By harnessing trusted insight and ingenuity – your Industrial Intelligence – you can open up new avenues for growth, drive decarbonization, and reshape the future for the mine-to-materials industry.

Engineering & Capital



Drive project success: standardize your processes and harness AI to boost efficiency, accelerate delivery, and unify teams from design to operations.

Energy Management



Optimize and reduce energy consumption with predictive insights and smarter forecasting.

Digitalization & Automation



Embrace innovation: boost efficiency, cut costs, and drive sustainable growth across your value chain.

Enterprise Excellence



Achieve enterprise excellence by integrating OT and IT to unlock real-time insights, optimize investments, and maximize long-term value.

Operating in
the new world

Navigating challenges
& trends

Power of digital
adoption

AVEVA's
Impact

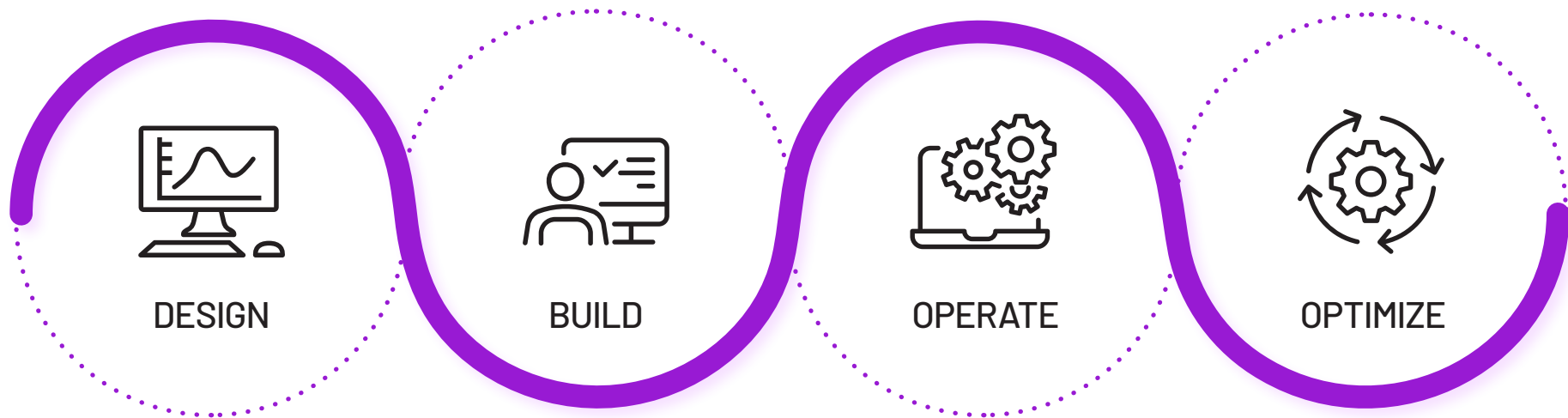
From mine
to materials



From mine to materials: Unifying the value chain with a digital thread

AVEVA's digital thread approach connects people, systems, and data across the entire value chain from resource extraction to finished materials enabling smarter, faster, and safer industrial operations.

By linking data across every stage of an asset's lifecycle — from initial design through construction, operations, and optimization — AVEVA ensures a continuous, integrated flow of information that drives efficiency, agility, and sustainability, unlocking your industrial intelligence.



Transforming **mining** through industrial intelligence

DESIGN & BUILD



Standardizing templates for critical mining infrastructure like crushers, mills, conveyors and other plant equipment, reduces design costs and keeps projects on track.

With strong data governance and a connected digital twin, mining teams can accelerate handover from construction to operations, linking engineering intent to real-time plant data for faster, safer decisions across the mining value chain.

OPERATE



By applying advanced analytics across mining equipment and processing plants, from mobile fleets to crushers and mills, operators can reduce downtime, improve throughput, and increase efficiency.

Real-time tracking of ore grades, stockpiles, and material flow helps optimize plant configuration, manage production variance, and remove bottlenecks across the mine-to-market value chain.

OPTIMIZE



Mining companies can boost reliability and reduce costs by using time-series data and predictive analytics to anticipate equipment issues and optimize maintenance.

Real-time insights also enable smarter ore control and blending, better plant utilization, and efficient coordination of shipment schedules—maximizing throughput, cutting energy waste, and ensuring delivery and quality targets are met.

How AVEVA **mining** customers harness Industrial Intelligence



With complex processes, multiple sites, and scattered data sources, Talison Lithium built a unified, cloud-enabled system for production reporting and tracking — from pit to port.

Results:

- Integrated data from operations, engineering, and metallurgy into a single, easy-to-use interface
- Reduced downtime and improved end-of-month reconciliation accuracy and efficiency
- Established one system to track data across mining, crushing, stockpiling, production, storage, and shipment

RioTinto

Rio Tinto uses integrated engineering tools to accelerate project delivery and reduce time to production. From pit to port, real-time data connects their operations to drive efficiency and performance across sites.

Results:

- Streamlined project delivery and boosted operational efficiency by connecting design and engineering tools
- Enabled cross-disciplinary teams to leverage analytics to identify downtime and reduce losses
- Built a dynamic, continuously updated library of new and legacy sites, accessible 24/7

Transforming **metals** through industrial intelligence

DESIGN & BUILD



By standardizing designs for core steelmaking infrastructure like furnaces, casting lines, and rolling mills, producers can cut engineering costs and keep projects on schedule.

Strong data governance and digital systems ensure smooth collaboration with EPCs, while a connected digital twin accelerates handover, linking engineering intent to real-time plant data for safer, faster ramp-up to production.

OPERATE



Use advanced analytics to monitor performance across the entire steelmaking process, from ironmaking and furnaces to casting and rolling, to reduce downtime and maximize throughput.

Gain real-time visibility into raw materials, production variances, and product quality, enabling faster decisions, improved efficiency, and stronger metallurgical outcomes.

OPTIMIZE



Harness condition monitoring and predictive analytics to stay ahead of equipment issues, extend asset life, and cut maintenance costs.

Boost production by optimizing equipment use and minimizing idle time, while driving down energy waste and emissions to improve sustainability and reduce operating costs.

How AVEVA **metals** customers harness Industrial Intelligence



Hindalco's philosophy is to drive efficiency and sustainability through innovation. By implementing an industrial data management solution at its alumina refinery, Hindalco has tackled operational challenges, boosted energy efficiency, cut costs, and improved product quality—setting a new industry benchmark.

Results:

- Analytics and optimization boosted alumina liquor productivity by 2%, while reducing steam and power consumption, delivering \$4.8M in value over 3 years
- Improved MTBF for CPP boiler heat-exchange tube leakage through centralized monitoring, control, and alarm alerts. Reduced maintenance from 7 to 4 hours.



CBMM faced inconsistent energy usage and operational inefficiencies due to manual control and lack of standardization in its electric arc furnace operations. By implementing a real-time data management and enterprise visualization solution they gained energy and cost savings.

Results:

- 5.5% reduction in energy consumption and approximately USD 140,000 savings annually.
- 7% decrease in cycle time along with enhanced safety and standardization

Operating in
the new world

Navigating challenges
& trends

Power of digital
adoption

AVEVA's
Impact

From mine
to materials



Transforming **cement** through industrial intelligence

DESIGN & BUILD



Standardizing designs for key cement plant infrastructure, such as crushers, kilns, and grinding mills, helps reduce engineering costs and keeps capital projects on track.

Strong data governance ensures EPC collaboration and digital consistency, while a connected digital twin accelerates handover by linking engineering design to real-time operations for safer, faster plant startup.

OPERATE



Use data and analytics to monitor cement plant performance, from crushing and calcination to grinding, to reduce downtime and maximize throughput.

Track material flow, production variances, and limestone quality across the value chain to improve efficiency, minimize waste, and ensure consistent output to spec.

OPTIMIZE



Boost cement plant reliability and output with predictive analytics and condition monitoring that reduce downtime and maintenance costs.

Optimize raw-meal blending and calcination with real-time data to ensure quality, maximize utilization, and cut energy use and emissions

Operating in
the new world

Navigating challenges
& trends

Power of digital
adoption

AVEVA's
Impact

From mine
to materials



How AVEVA **cement** customers harness Industrial Intelligence



OYAK Cement faced the urgent challenge of cutting energy costs and reducing its carbon footprint in a highly energy-intensive industry. By gathering accurate data from many disparate sources, they implemented an operational data solution across seven plants in just 100 days.

Results:

- Replaced 30% of fossil fuels with renewable energy
- Saved €5–7 million for every 1% reduction in energy use



Votorantim

Votorantim Cimentos partnered with AVEVA to gain deeper insights into asset performance and shift to a condition-based maintenance strategy. By deploying a predictive analytics solution, they now use machine learning to anticipate equipment behavior and maintain full control of operational data across every stage of optimization.

Results:

- 10% reduction in recurring maintenance and 6% increase in reliability, reaching 91% target
- Unplanned maintenance cut from 52% to 42% of global maintenance costs
- Achieved savings of US\$5.5M per site, totaling US\$88M globally

Operating in
the new world

Navigating challenges
& trends

Power of digital
adoption

AVEVA's
Impact

From mine
to materials



Innovation isn't enough.

To truly transform **mining**, **metals**, and **minerals** into efficient, sustainable, and responsible industries that power our modern world, we need intentional, data-driven action.

AVEVA can take you there! Are you ready?



Citations:

1. [Global Critical Minerals Outlook 2024](#)
2. [Mine 2024: Preparing for impact | PWC](#)

AVEVA

For more information, please visit:
aveva.com/en/industries/mining-metal-minerals/

 linkedin.com/company/aveva

 [@avevagroup](https://twitter.com/avevagroup)

About AVEVA

AVEVA is a global leader in industrial software, driving digital transformation and sustainability. By connecting the power of information and artificial intelligence with human insight, AVEVA enables teams to use their data to unlock new value. We call this Performance Intelligence. AVEVA's comprehensive portfolio enables more than 20,000 industrial enterprises to engineer smarter, operate better and drive sustainable efficiency. AVEVA supports customers through a trusted ecosystem that includes 5,500 partners and 5,700 certified developers around the world. The company is headquartered in Cambridge, UK, with over 6,500 employees and 90 offices in over 40 countries.

Learn more at www.aveva.com

AVEVA and the AVEVA logo are a trademark or registered trademark of AVEVA Group Limited in the U.S. and other countries. All product names mentioned are the trademarks of their respective holders.

© 2024 AVEVA Group Limited or its subsidiaries. All rights reserved.

